INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/18441

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : C12Q 1/26; C12N 9/04, 9/90

US CL : 435/25, 189, 190, 233; 702/19, 22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 435/25, 189, 190, 233; 702/19, 22

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS, DWPI, STN: Medline, Caplus, Scisearch, Lifesci, Biosis, Embase

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P ---- Y,P	SOMERS et al. GDP-fucose synthetase from Escherichia coli: Structure of a unique member of the short-chain dehydrogenase/reductase family that catalyzes two distinct reactions at the same active site. Strucure 15 December 1998, Vol. 6, No. 12, pages 1601-1612, see abstract.	1-15 ------- 16-29
A	ANDRIANOPOULOS et al. Identification of the fucose synthetase gene in the colanic acid gene cluster of Escherichia coli K-12. J. Bacteriol. February 1998, Vol. 180, No. 4, Pages 998-1001, see abstract.	1-29
A	BRANDEN et al. Introduction to Protein Structure. New York: Garland Publishing, Inc. 1991, pages 269-285.	1-14

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 19 OCTOBER 1999	Date of mailing of the international search report 24 NOV 1999
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer NASHAAT T. NASHED Telephone No. (703) 308-0196

Form PCT/ISA/210 (second sheet)(July 1992)*

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,P	US 5,853,973 A (KAKEFUDA et al.) 29 December 1998, see abstract.	23-29
A	MOSIMANN et al. A critical assessment of comparative molecular modeling of tertiary structures of proteins. Proteins: Struc., Func. Genet. 1995, Vol. 23, pages 301-317.	23-29
A	TILBEURGH et al. Lipoprotein lipase J. Biol. Chem. 11 February 1994, Vol. 269, No. 11, pages 4626-4633, see abstract.	23-29
A	TAPIA et al. Computer assisted simulations and molecular graphics methods in molecular design. 1. Theory and application to enzyme active-site directed drug design. Mol. Engin. 1994, Vol. 3, pages 377-414.	16-29

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Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ **Claims Nos.:**
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ **Claims Nos.:**
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ **Claims Nos.:**
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☒ No protest accompanied the payment of additional search fees.

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BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING
This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claims 1-9, 11-14, 16, and 17, drawn to crystalline GFS, model of the structure of GFS,a method of using the model to identify agonist or antagonist of GFS (first use) and the product of the method.
Group II, claim 10, drawn to a model of GFS obtained by NMR.
Group III, claim 15, drawn to computer system.
Group IV, claims 18-22, drawn to method of identifying inhibitor (a second use) and the method's product.
Group V, claims 23-29, drawn to a method of identifying modulator of human FX using the model of GFS, wherein said the method involve a modeling step.

The inventions listed as Groups I-V do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: The special technical feature of the invention of Group I is the crystalline GFS which is different from the technical features of Groups II-V. The special technical feature of the invention of Group II is the NMR method for determining protein structure which does not does not require a crystalline protein. NMR spectroscopy is not utilized of any of Groups I, and III-V. The special technical feature of the invention of Group III is the computer system which is different those of Groups IV and V. The special technical feature of the invention of Group IV is GFS model which is a second use of the model of GFS, whereas the special technical feature of the invention of Group V is the modeling method which utilizes the model of GFS to model the structure of human FX protein. Thus, the claimed inventions do not relate to a single inventive concept under PCT Rule 13.1.